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44-9-876

Date **September 2, 1944**

Subject ~~Report of Overstreet & Jacobson~~

Waste Disposal

By Whitaker

Tc **Stone**

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TO Dr. R. S. Stone

FROM M. D. Whitaker

IN RE: Report of Overstreet and Jacobson

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Dr. Hamilton sent me a copy of his report covering the work of Dr. Overstreet and Dr. Louis Jacobson at Clinton in connection with our study of waste disposal. I have given this report to several of our people with a request that they criticize it. I am reproducing in the paragraphs which follow the criticisms which I have gotten as a result of my request. I think these criticisms should be weighed for whatever they are worth and that it should be kept in mind that criticism of this report was assigned as a task to the individuals responsible for the remarks below.

The submitted report perhaps over-emphasizes the amount of activity found in White Oak Creek, is inaccurate at two points as to history, and in my opinion is incorrect as to the mechanism of obtaining an active deposit in the creek bed.

Jacobson and Overstreet state that the mud found at a number of places in the creek was quite strongly active, and even at the mouth of the creek was appreciably active. Furthermore, they say that evidently enough activity had been discharged to create an undesirable situation. The activity in the mud at the mouth of the creek certainly did not approach tolerance limits from a health point of view. The Health Physics Section is better able to judge the seriousness of the situation and so sections of CH-1889 by H. M. Parker are quoted:

Page 8 - "The ingestion tolerance concentration ... for the total liquor (diluted chemical wastes) is $16.8 \mu\text{c}/\text{liter}$. As far as external radiation is concerned ... the tolerance concentration for ... combined ($\beta + \gamma$) radiation is $1.8 \mu\text{c}/\text{liter}$. Therefore, at the present time, the hazard of ingestion is not the controlling feature. For a daily discharge of 600,000 gallons, 1 to $2 \mu\text{c}/\text{liter}$... corresponds to $2\frac{1}{2}$ to 5 curies.

Page 9 - "During a two-month period (the one under consideration) in which approximately 5 curies of active material were discharged per day, the activity of the clay in the creek rose to $4 \mu\text{c}/\text{gm}$ of dried clay. For a long period the value might rise to $30 \mu\text{c}/\text{gm}$. In the dam itself the activity would probably not exceed $.1 \mu\text{c}/\text{gm}$.

Also Page 9 - "A permissible discharge of 5 curies per day of waste water of approximately the present composition is less conservative than that given by J. G. Hamilton (letter to S. T. Cantril, 6/20/44). The latter was inadvertently based on the minimum Clinch flow."

This document has been approved for release to the public by:

David R. Hamm 5/20/95
Date
Technical Information Officer
ORNL Site

CLASSIFICATION CANCELLED

ADD signature Ch Morgan 4-6-95 Date

Single rereview of CCRP-declassified documents was authorized by DOE Office of Declassification memo of August 22, 1994.

In the report by Overstreet and Jacobson they state (Page 1) that the situation had arisen as a result of the discharge of active wastes into the creek since the beginning of the pile operation in December, 1943. Actually discharge was not started until 3/4/44 and was discontinued on 4/27/44. On Pages 1 and 6 they state that the calcium chloride treatment which was started ten days prior to their study resulted in the removal of a large fraction of the activity. Actually, this treatment occurred in W-5, where it removed about half of the activity, but the discharge was from W-6. The spill-over of less active wastes from W-5 to W-6 resulted in some decrease (to 78%) of the original activity in the material being discharged to the ponds. Thus the CaCl_2 treatment was just beginning to take effect at the time discharge was discontinued. On Page 7 it is stated that the decontamination of the water is dependent on the efficient removal of suspended matter formed on mixing the waste and cooling water in the ponds which implies that an attempt was made to remove suspended solids. This was not the case.

On Page 4 of the report the statement is made that the data in Table I show that fission products are fixed on soils of the type occurring along White Oak Creek. The data only show that a slurry taken from the creek bed was active. It is my guess that most of the activity in this slurry was still on the precipitate that was formed when the waste and dilution water were mixed in the ponds and which carried almost all of the activity out of the solution. The obvious explanation is that this precipitate carrying activity was washed down and spread over the creek bed. Mechanical mixing with suspended mud gave varying concentrations of the activity in the bed. There is no evidence to support the theory that the activity leaves the precipitate and exchanges with the naturally occurring clays.

Jacobson and Overstreet noted on the top of Page 7 that the precipitate formed in the ponds carried the bulk of the activity. Data from M. D. Peterson (CN-1860, P.9) show that 93% of the activity is removed from the chemical wastes in three hours by the precipitate formed on a 70-fold dilution of the waste.

Perhaps it is not important which mechanism actually takes place, but if the simpler explanation holds, then also it would not be expected that there would be much dilution of the mud activity due to exchange with inactive mud. This explanation perhaps better explains why there was not so great a decrease in activity of the mud from 5/1/44 to 7/4/44 as was expected on the basis of the exchange theory (See Page 6).

MDW/er

- 1 - Dr. R. S. Stone
- 2 - M. D. Whitaker
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